CS 321: Introduction to HCI

Methods for Design, Prototyping and Evaluating User Interaction

Lecture 5:
Design of Everyday Things

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SIUe

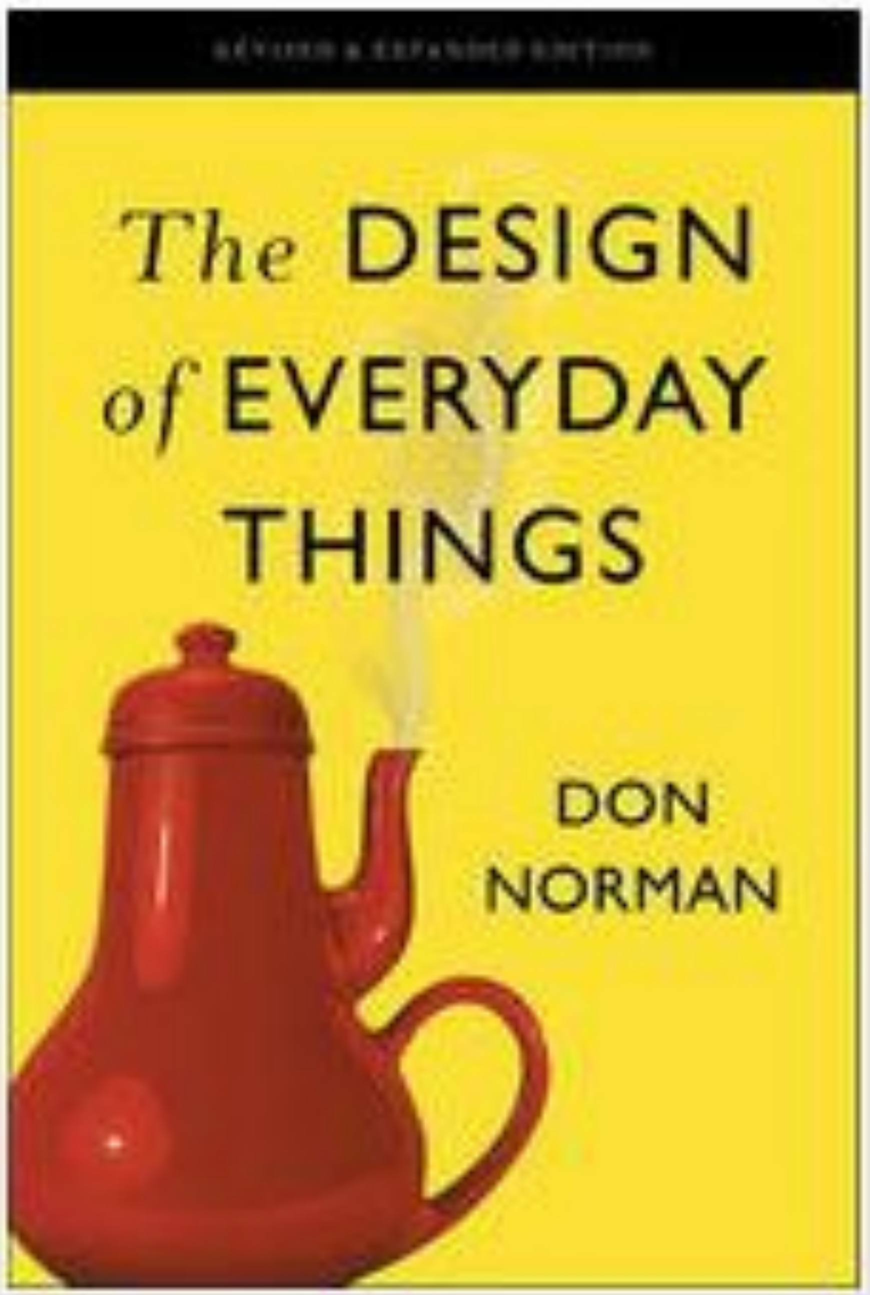
What we will do today

It is never a user's fault!

Design of Everyday Things reviews a common and useful vocabulary of design

We will use these in feedback and conversations without even realizing that we are doing it

You should know these terms and recognize them in practice



[Vox Door Design Video]

[99% Invisible Post]. (Just read and listen everything there!) =)

What is Interaction?

Two-Way

- One-way is reaction

Communicative

- Information is sent

Receptive

- Information is received

Effective

- There are changes as a result

What is Interaction?

Two-Way

One-way is reaction

Communicative

Information is sent

Receptive

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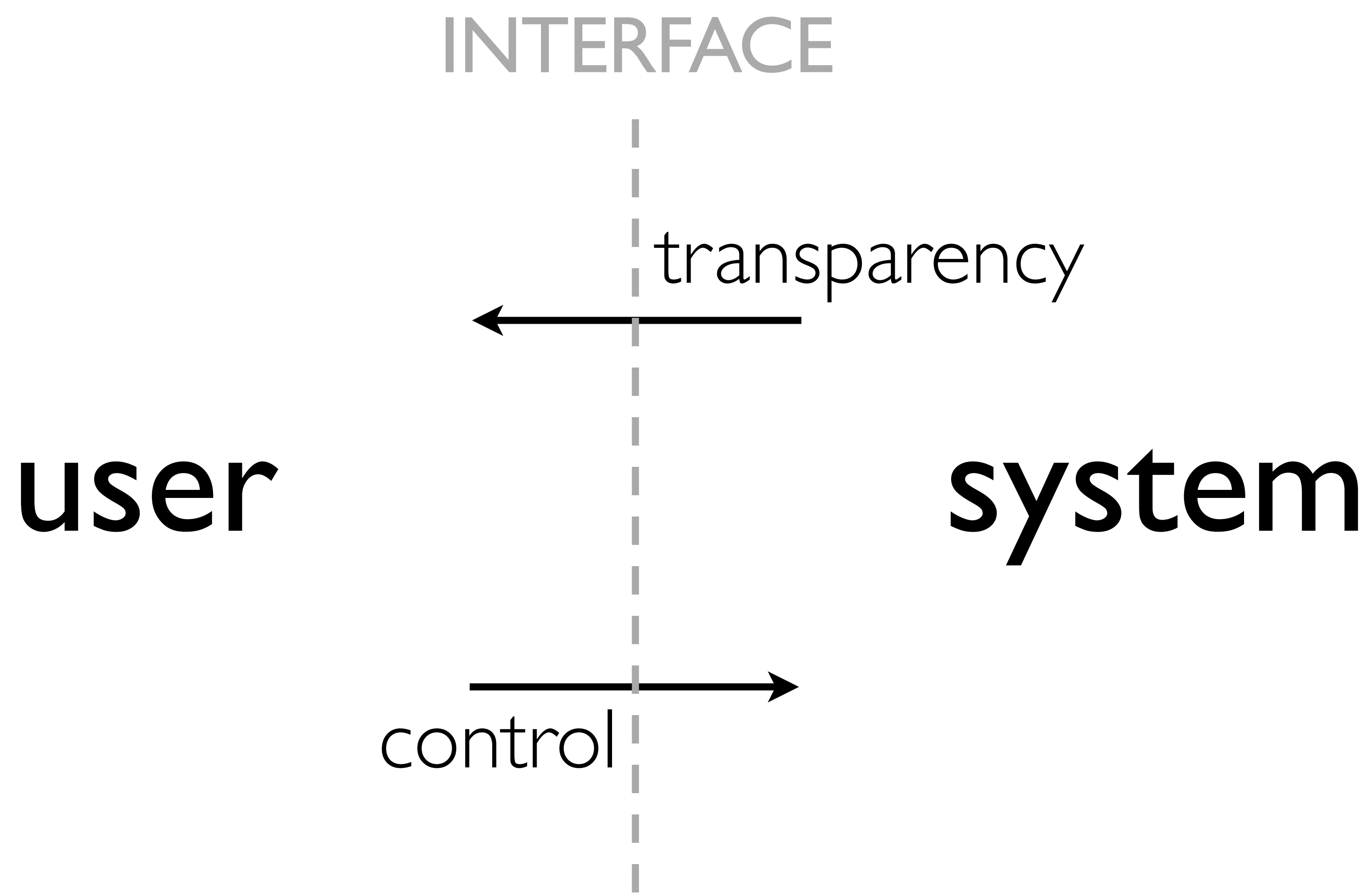
Effective

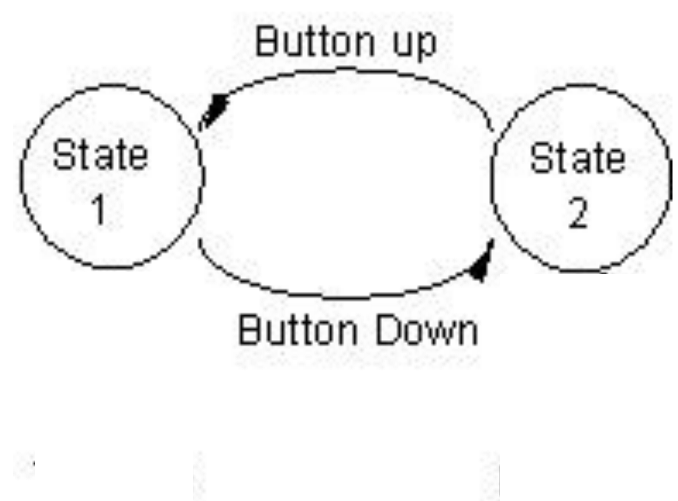
There are changes as a result

Interaction with an Interface



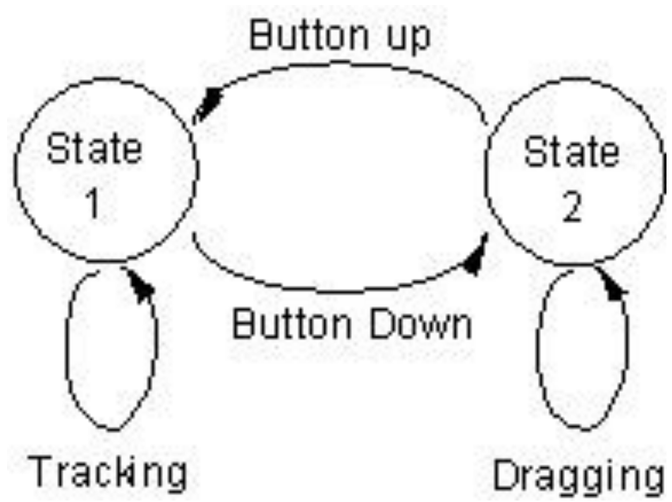
Buxton's 3-State Model

Graphical Input interaction modelling



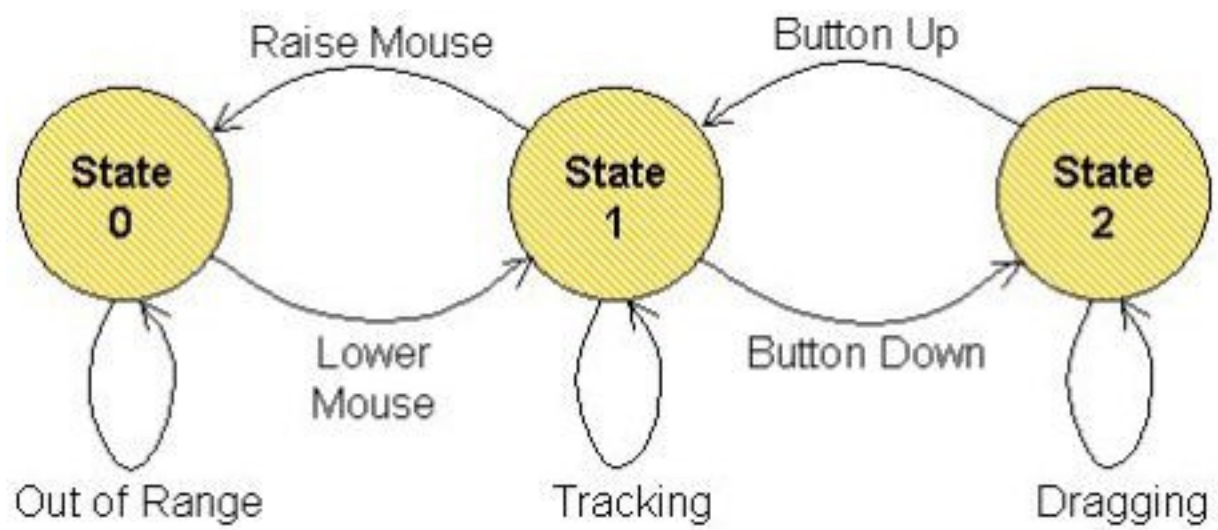
Buxton’s 3-State Model

Mouse Model



Buxton’s 3-State Model

Stylus on a trackpad model



Design model

designer

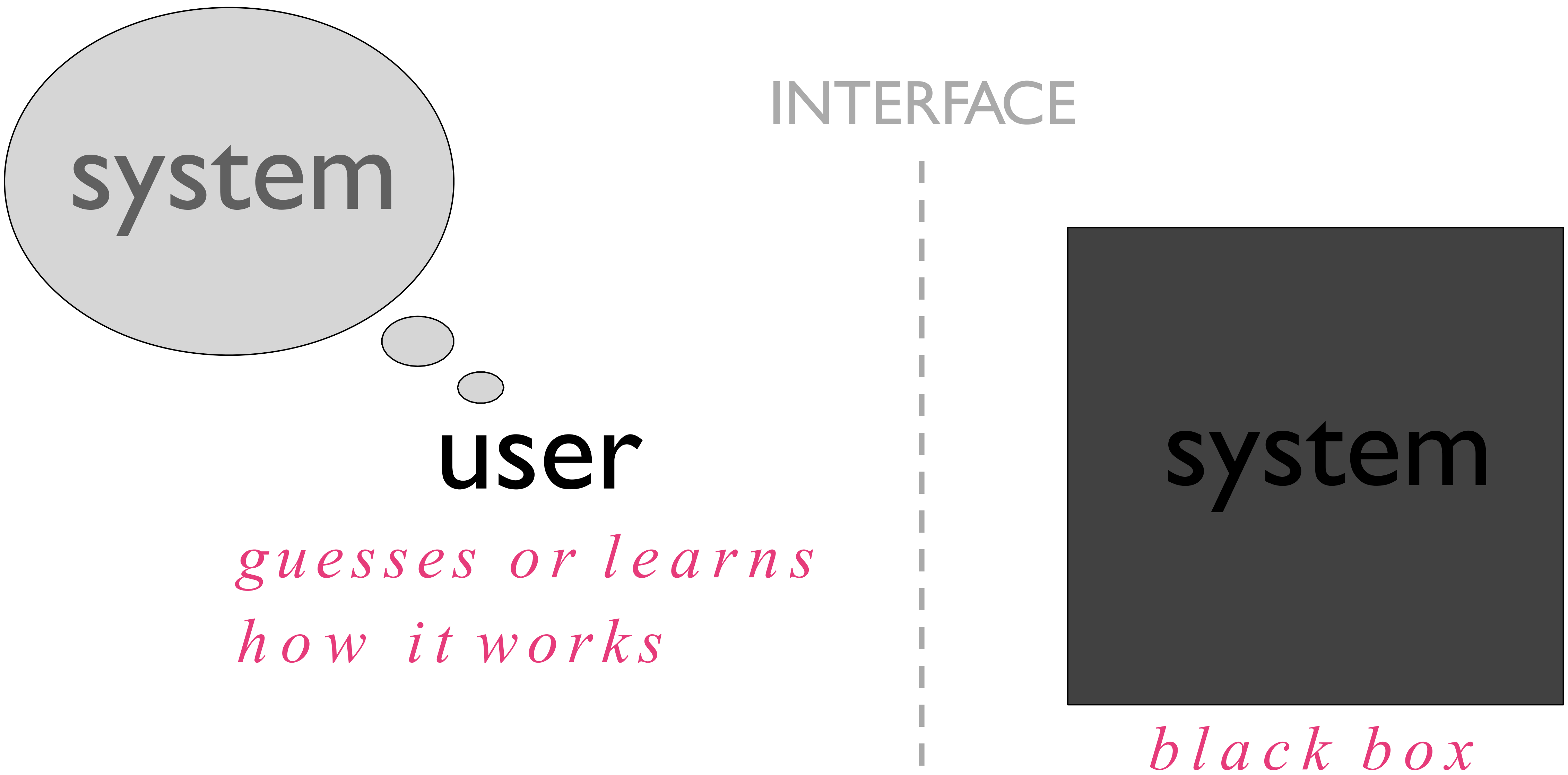
INTERFACE

knows exactly how it works

user

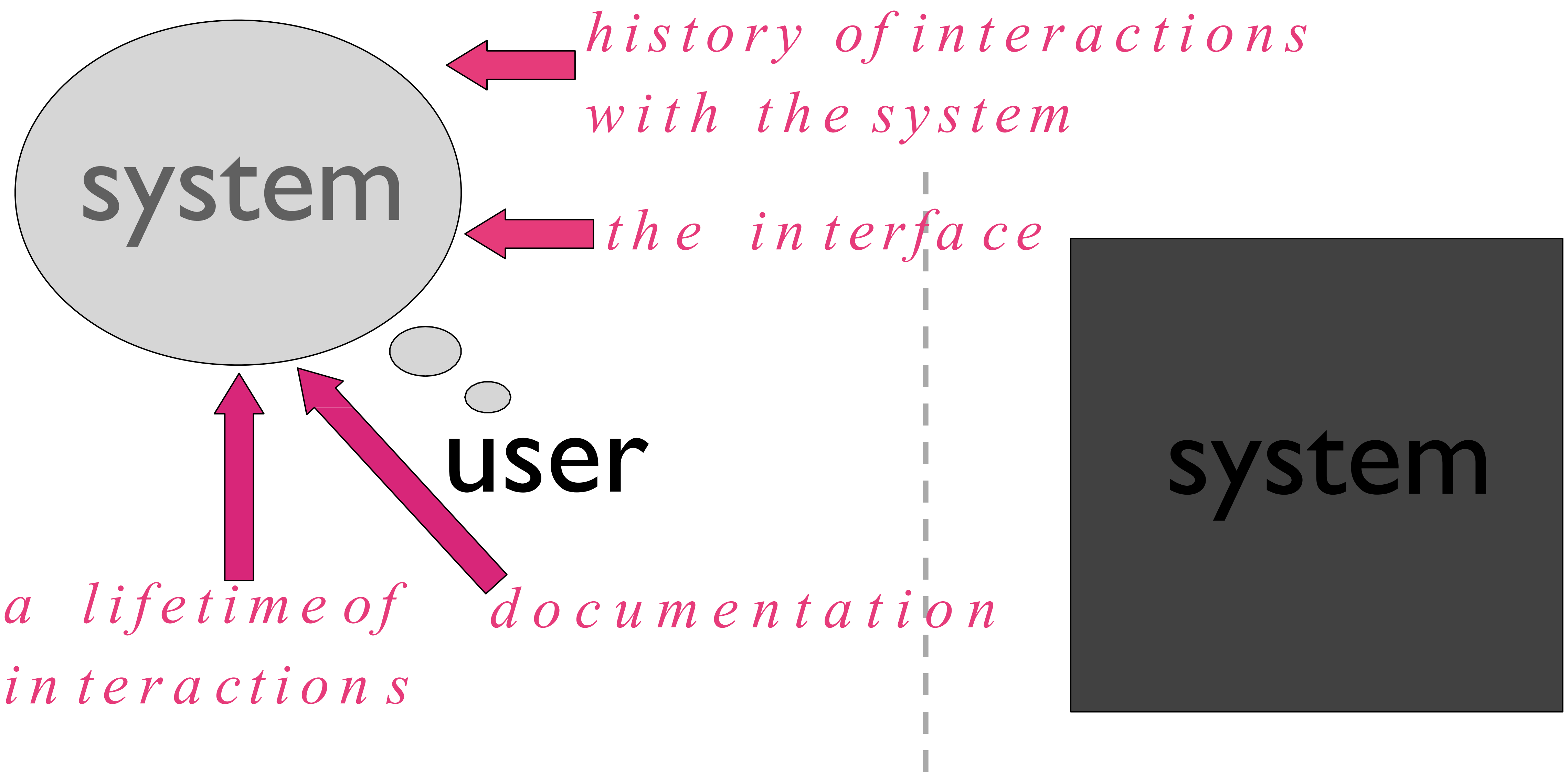
system

Conceptual model



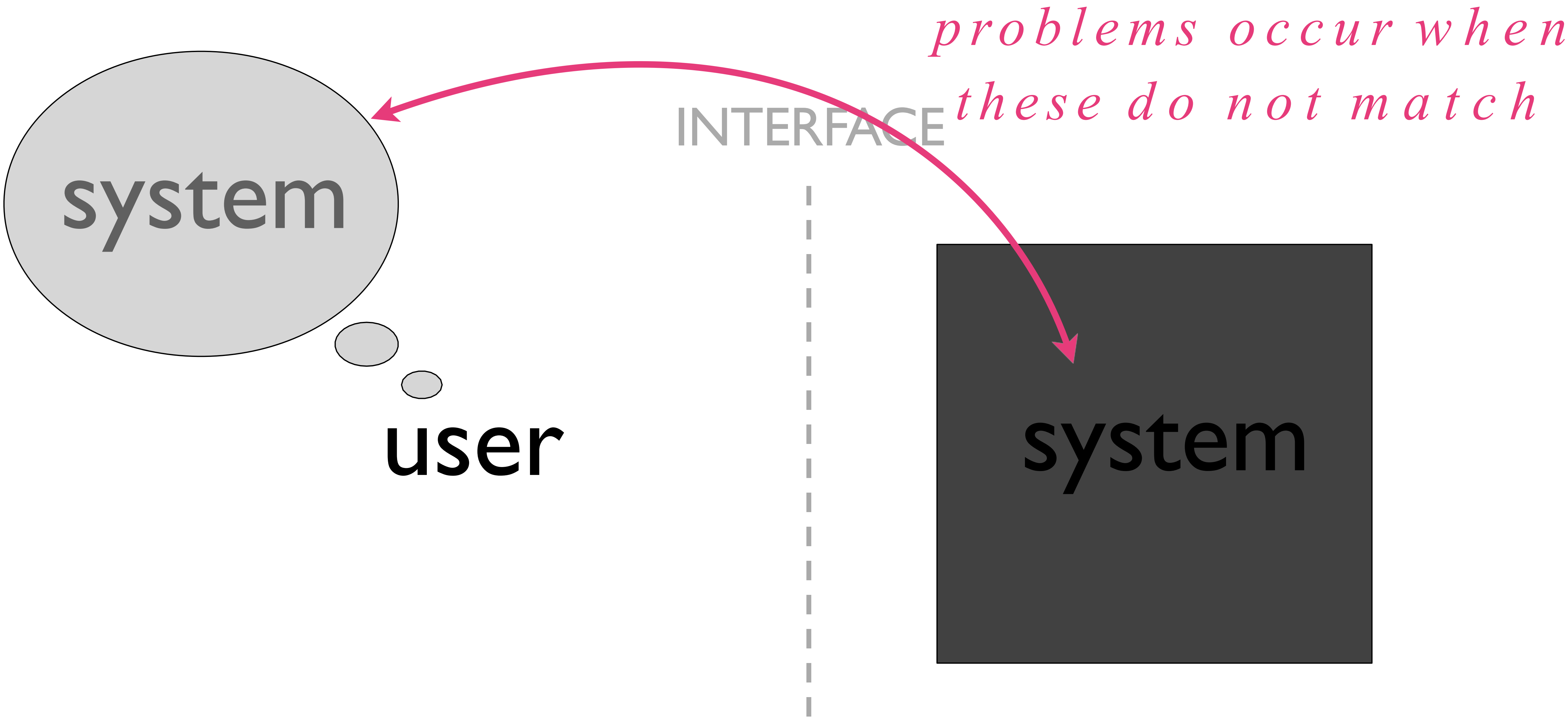
Conceptual models are mental representation of how something works

Conceptual model

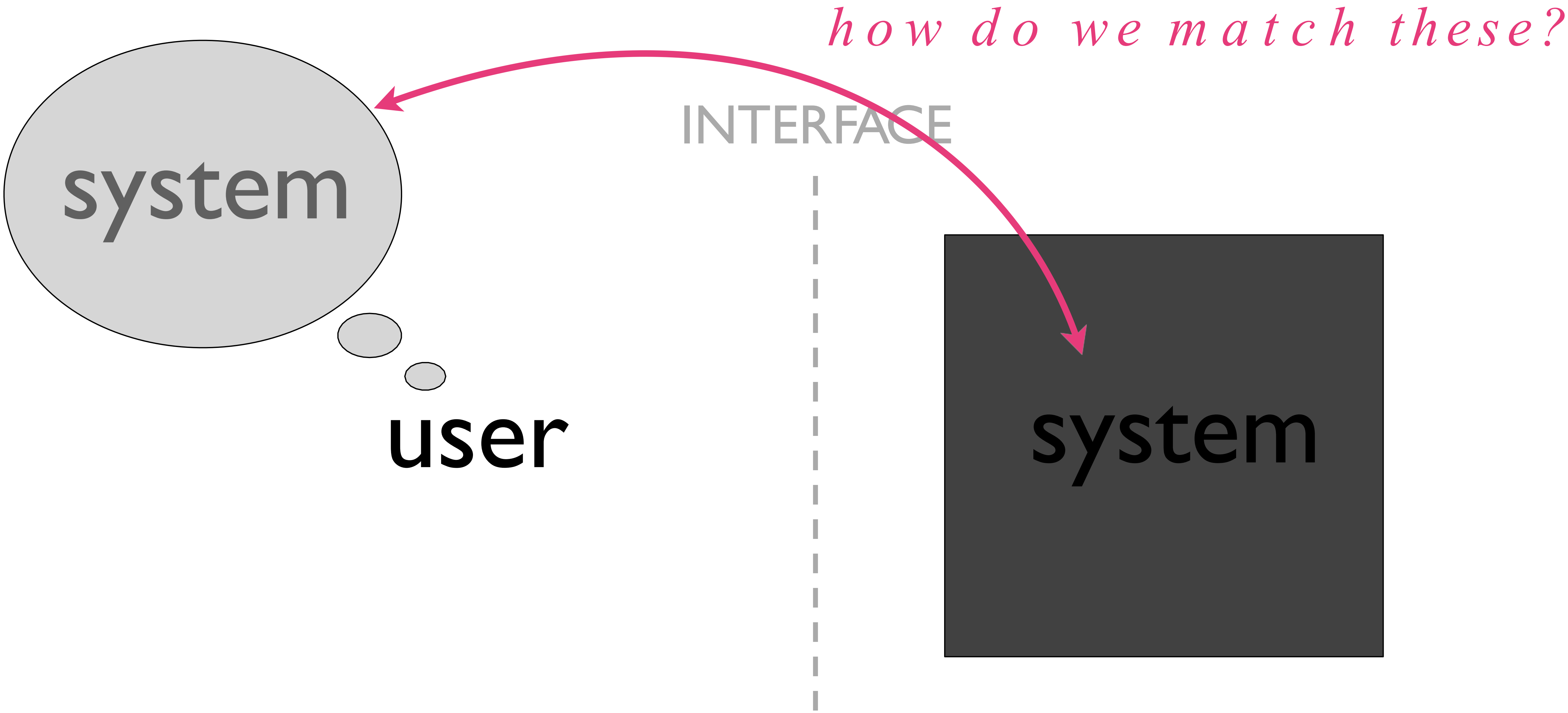


Conceptual models depend on the **user** and the **interface**

Conceptual model



Design principles

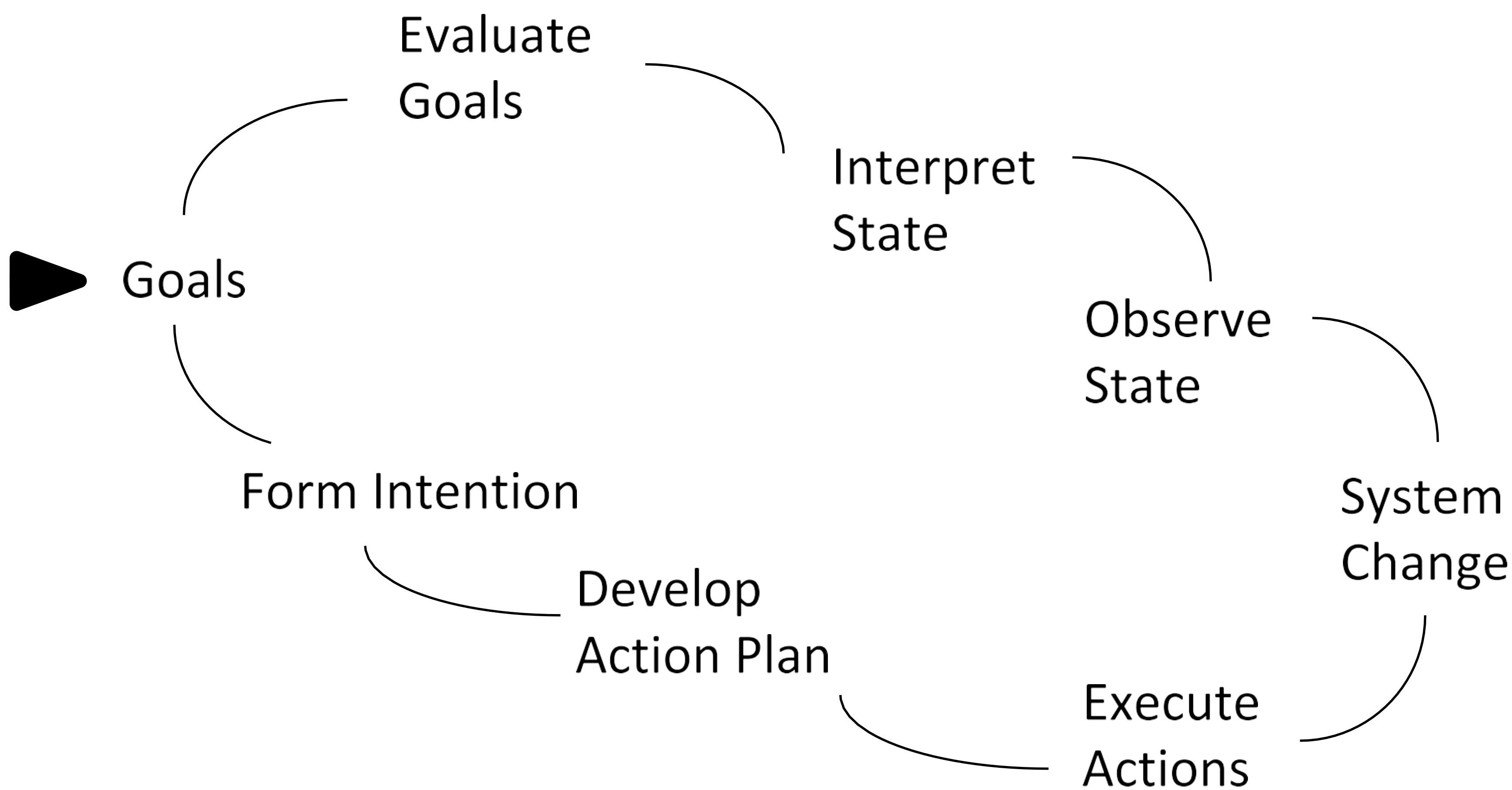


Norman’s Execution-Evaluation Cycle

1. Establish the goal
    Increase light in the room
2. Form the intention
    To turn on the lamp
3. Specify the action sequence
    Walk to the lamp, reach for the knob, twist the knob
4. Execute the action sequence
    [walk, reach, twist]
5. Perceive the system state
    [hear “click” sound, see light from lamp]
6. Interpret the system state
    The knob rotated. The lamp is emitting light. The lamp seems to work
7. Evaluate the system state with respect to the goals and intentions
    The lamp did indeed increase the light in the room [goal satisfied]

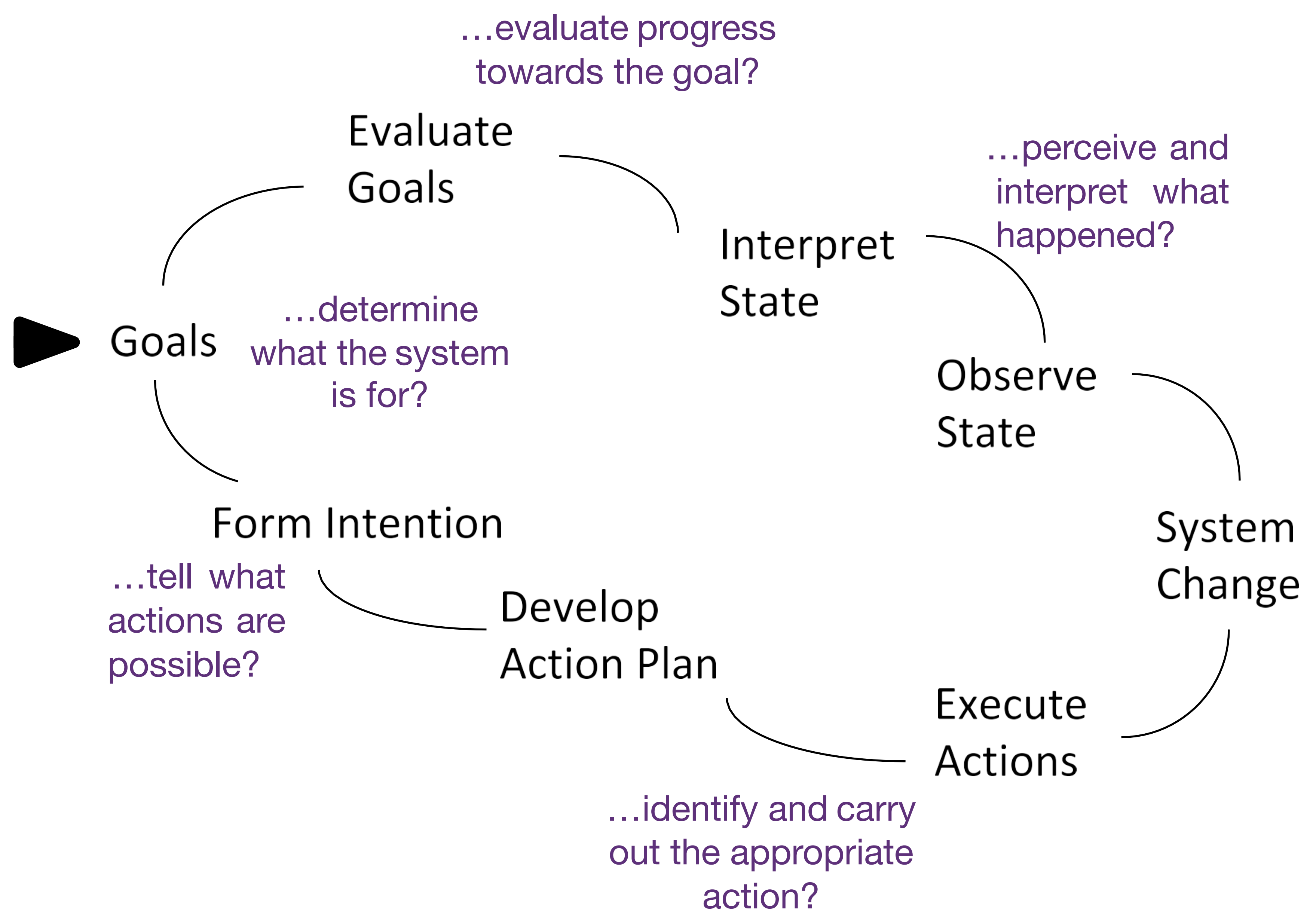
[REPEAT!]

Norman's Execution-Evaluation Cycle

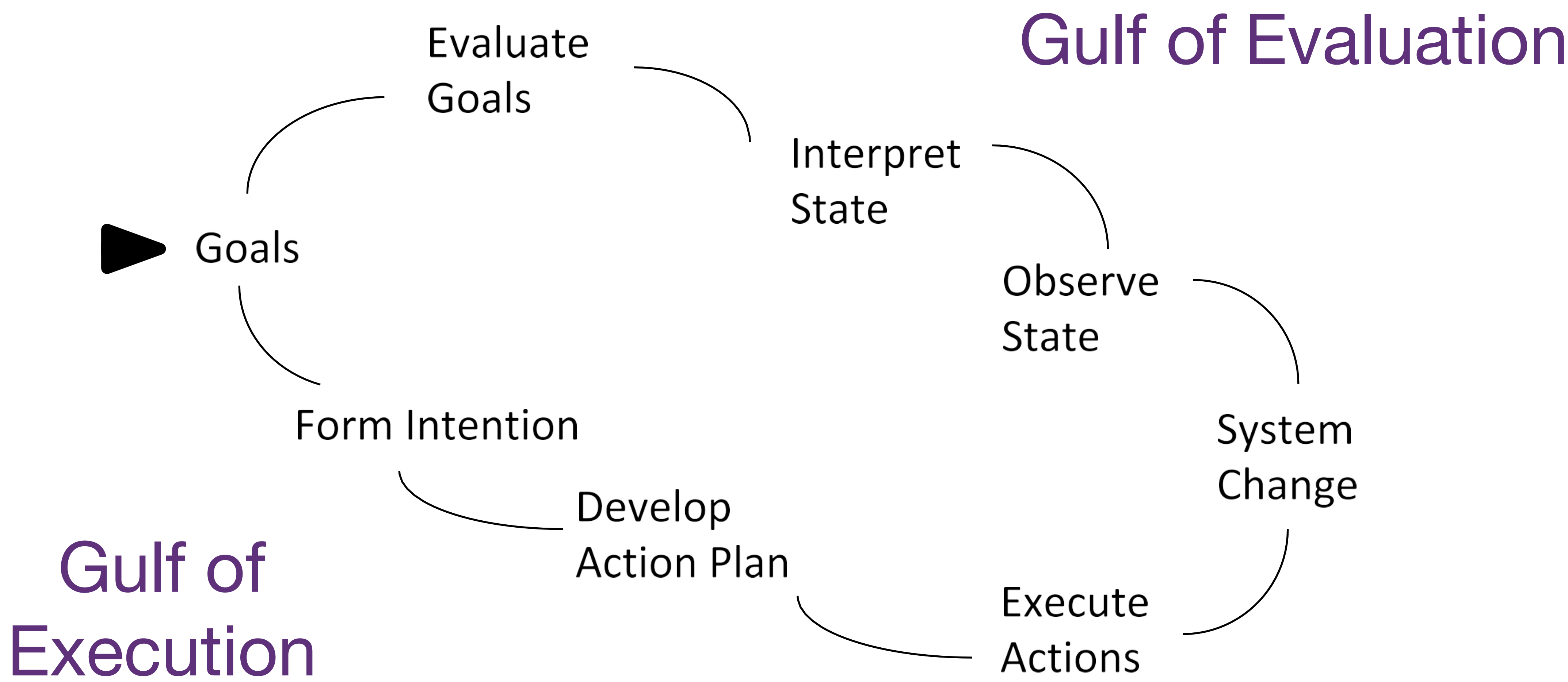


Bridging the Gulfs

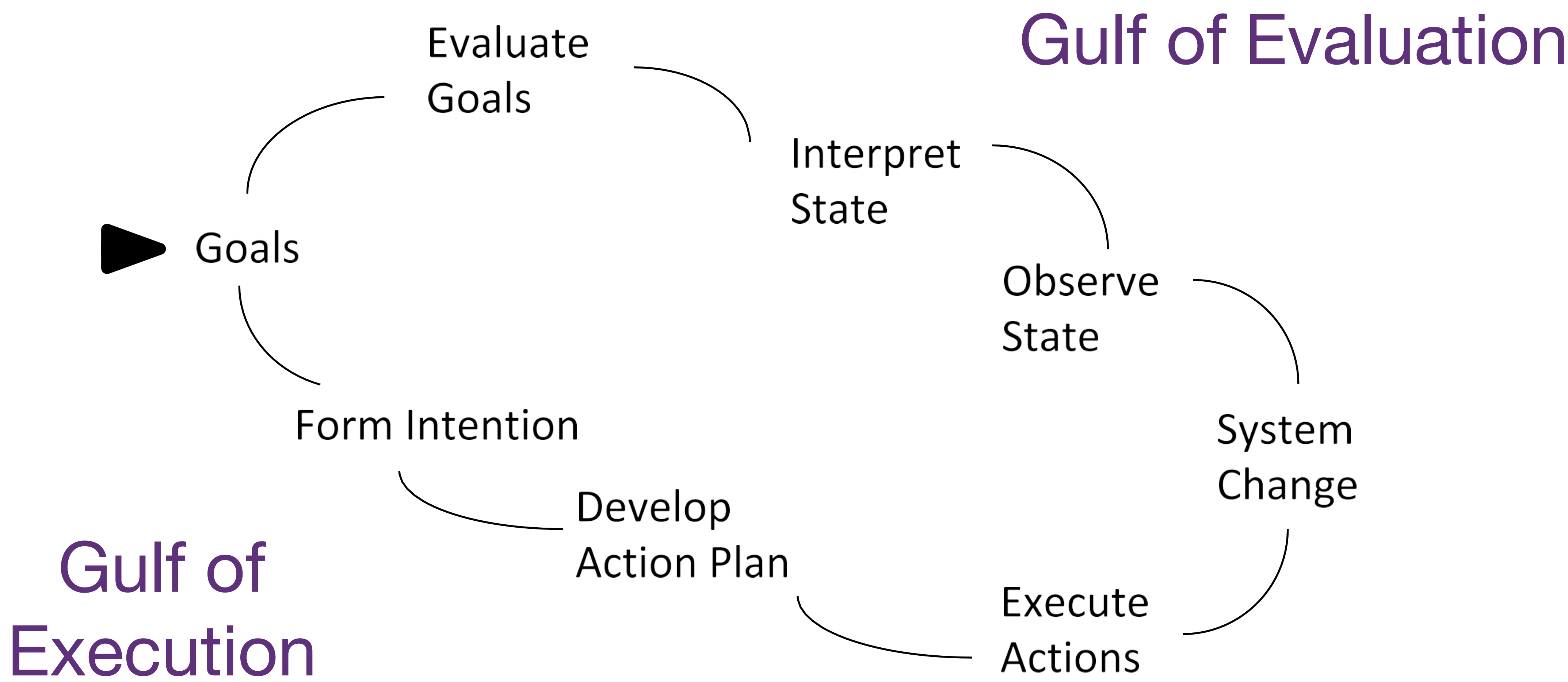
Ask yourself: How easily can the user…



Norman’s Execution-Evaluation Cycle



Norman's Execution-Evaluation Cycle



What factors can extend the Gulfs in the example of increasing light in the room?

Bridging the Gulfs

Gulf of Execution: "How do I do it?"

- Commands and mechanisms need to match the goals, thoughts, and expectations of a person

Gulf of Evaluation: "What does it mean?"

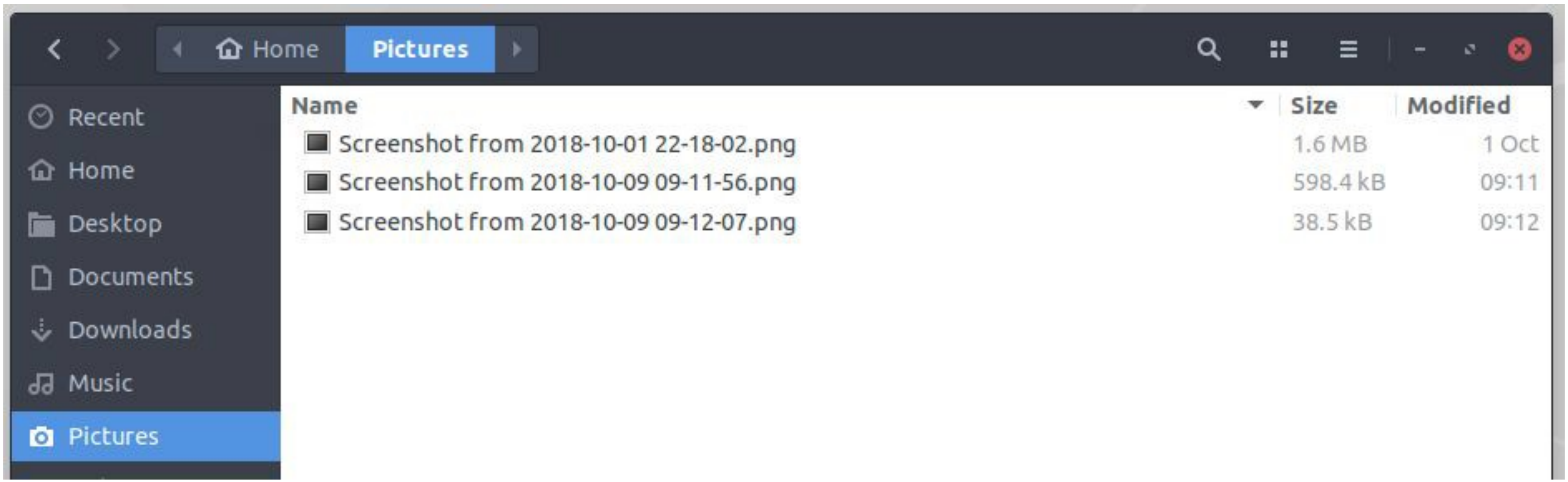
- Output needs to present a view of the system that is readily perceived, interpreted, and evaluated

People build mental models to anticipate and interpret system response to their actions

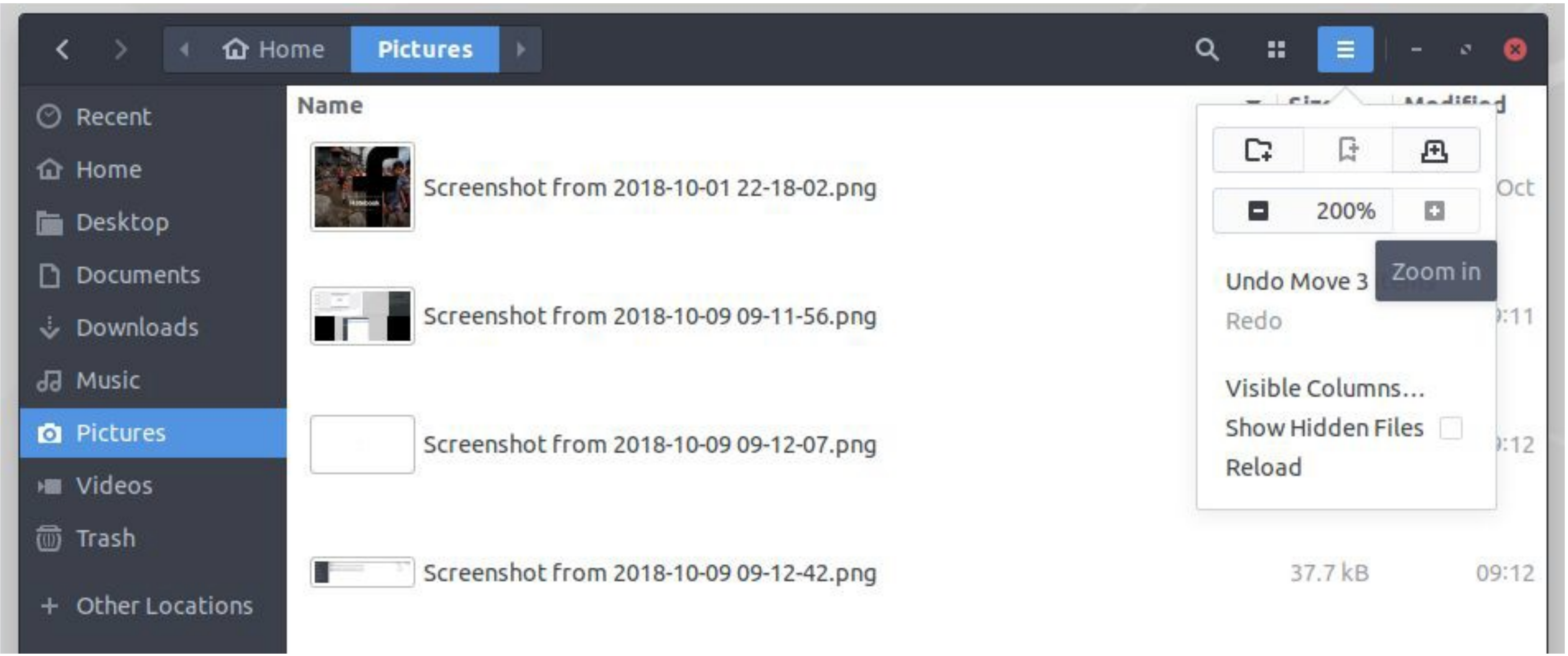
What can I do?	How do I do it?
What result will it have?	What is it telling me?

Let's Bridge the Gulfs...

… of finding the right Screenshot in my computer!

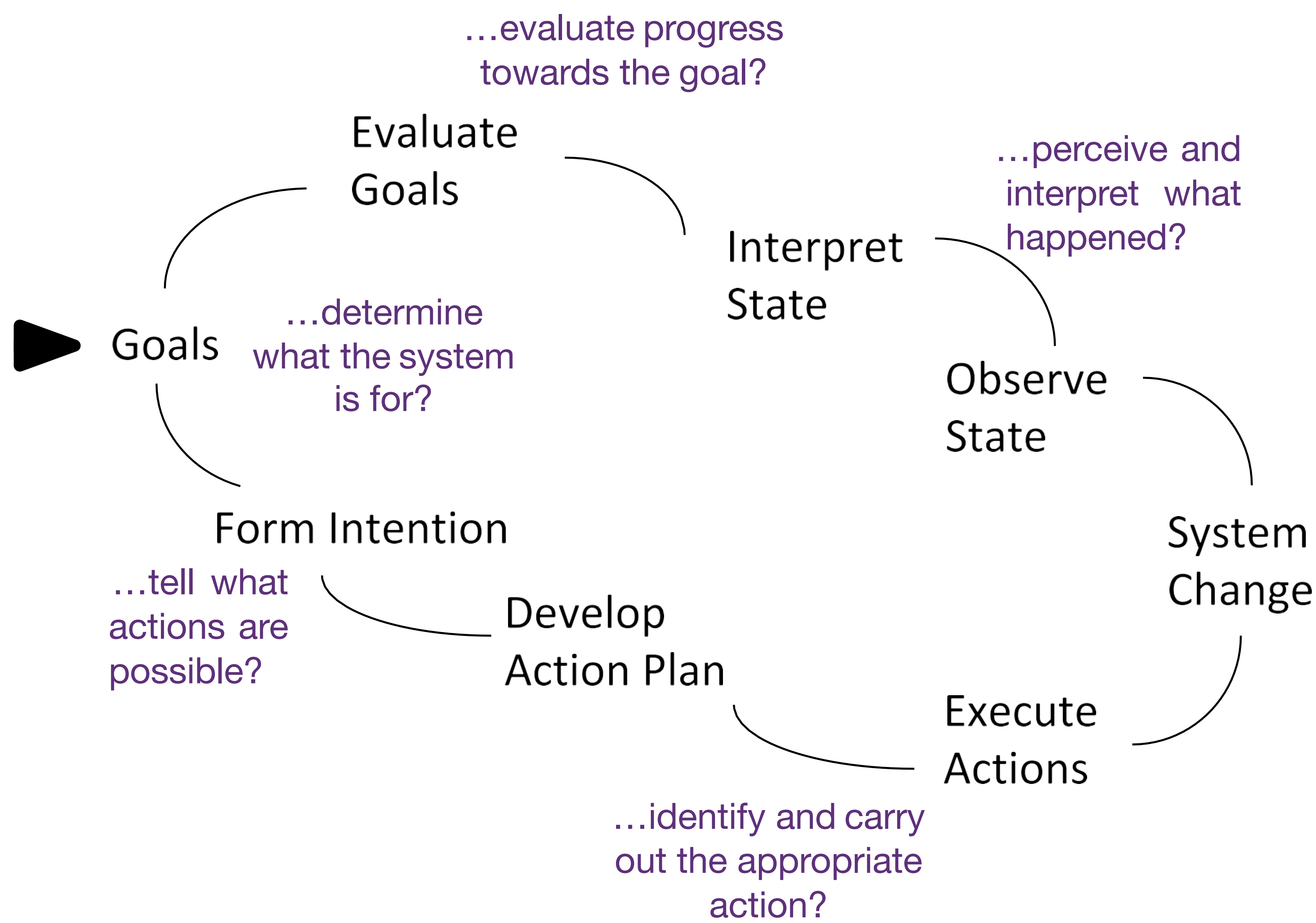


Gulf of Evaluation: An Example



Bridging the Gulfs

Ask yourself: How easily can the user…



Design principles help us answer these questions

Affordances
Constraints
Feedback
Consistency
Metaphors
Mappings
Visibility

Design principles help us answer these questions

Affordances

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Affordances

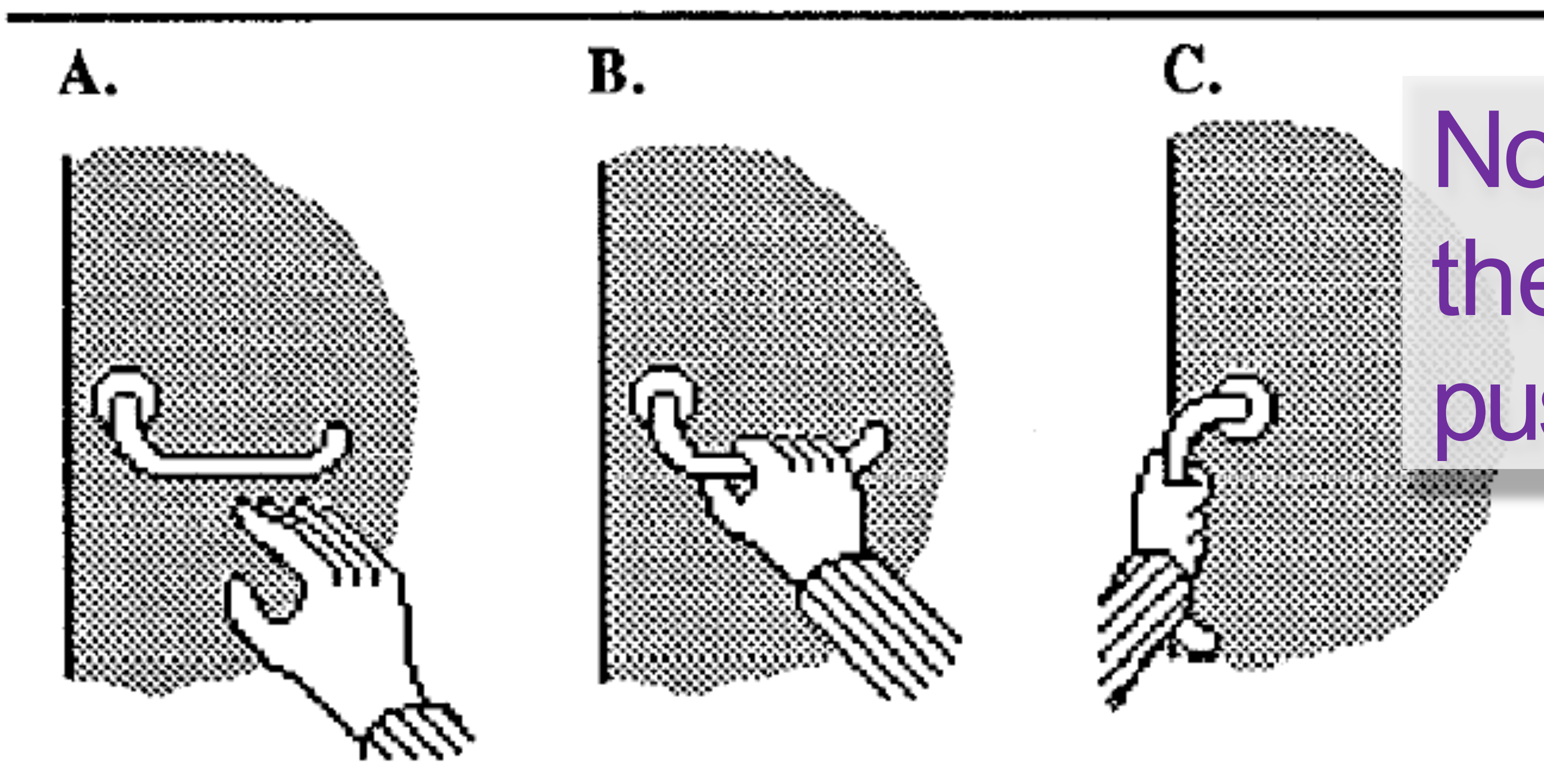
- Visual clue to interaction
  - –knobs afford turning
  - –levers afford moving
  - –buttons afford pushing

Handles afford pulling

Using a flat plate would constrain the user to push

Sequential Affordance

Acting on a perceptible affordance leads to information indicating new affordances



Now does the door push or pull?

Figure 4. Sequential affordances: one affordance leads to another. Visual information indicates grasping (A & B); tactile information indicates turning (B & C).

In Other Words

An affordance is what a thing communicates about how it can be used, often by its appearance

"In general, when the apparent affordances of an artifact matches its intended use, the artifact is easy to operate. When apparent affordances suggest different actions than those for which the object is designed, errors are common."

Gaver

Challenges arise if there is a mismatch between implied use versus intended use

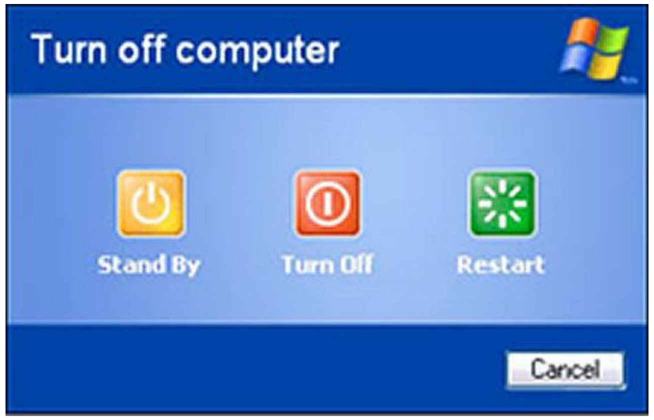
Affordances

Perceived Possible Actions

What does this chair afford?

Affordances

Technology affordances are often based in affordances from the physical world

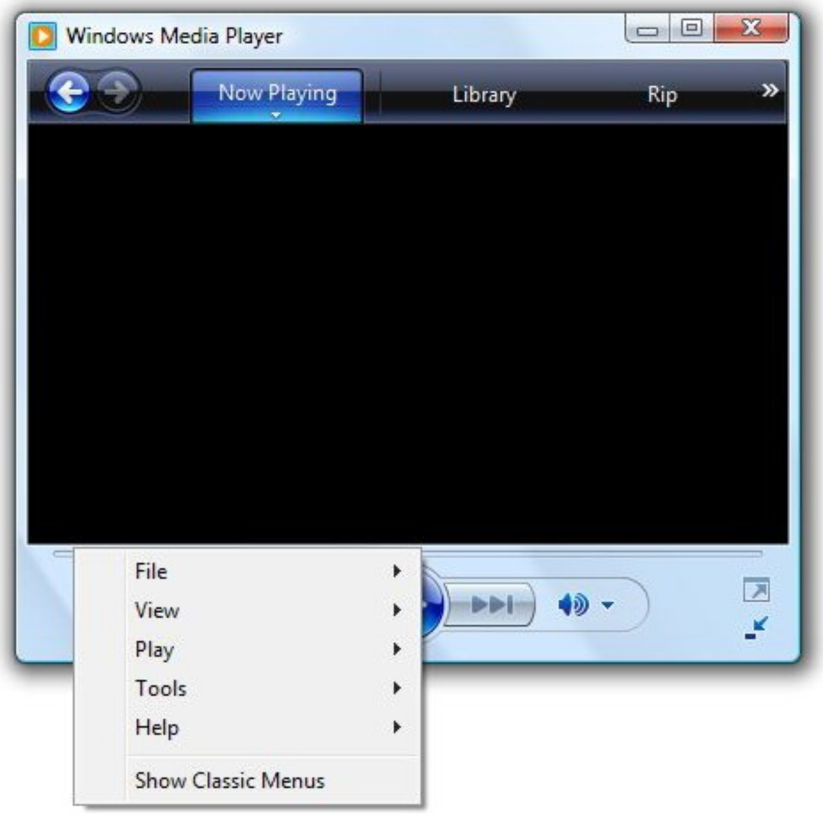


False affordances

False affordances

Hidden affordances

When there is no perceptual information suggesting an actual intended use



Hidden affordances

Logos linking to home is a convention, but not afforded by the page

Clarification on Convention

"Designers sometimes will say that when they put an icon, cursor, or other target on the screen, they have added an 'affordance' to the system. This is a misuse of the concept. … It is wrong to claim that the design of a graphical object on the screen 'affords clicking.' … Yes, the object provides a target and it helps the user know where to click and maybe even what to expect in return, but those aren't affordances, those are conventions, and feedback, and the like. … Don't confuse affordances with conventions." **Norman**

Affordances vs Signifiers

Affordances are the possible interactions **between people and the environment**. (It is not a property of the "thing"!)

Perceived affordances often act as signifiers, but they can be ambiguous.

Signifiers signal things, in particular what actions are possible and how they should be done. Signifiers must be perceivable, else they fail to function.

Norman

Design principles

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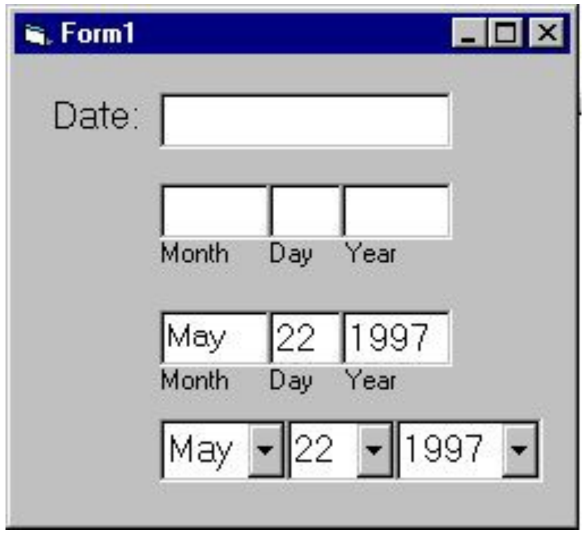
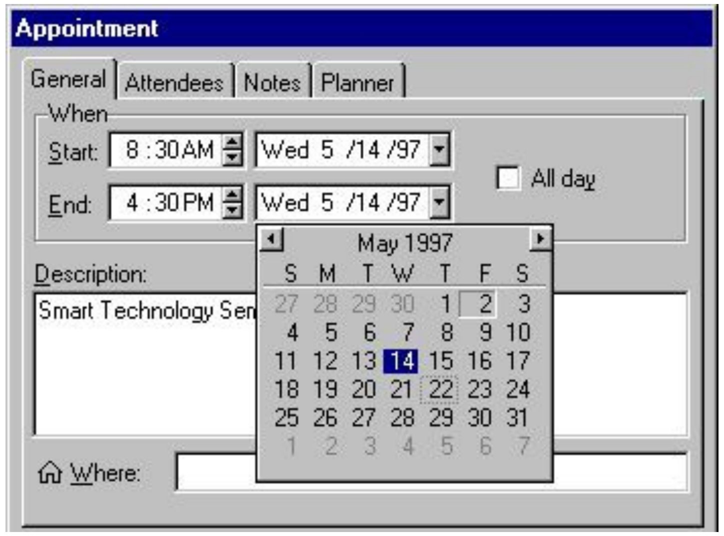
Constraints

Prevent some actions while allowing others





Prevent errors before they can happen

- Disruptive error messages are a last resort

Constraints

Design principles

Affordances

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Feedback

All actions have to be confirmed

Must be immediate

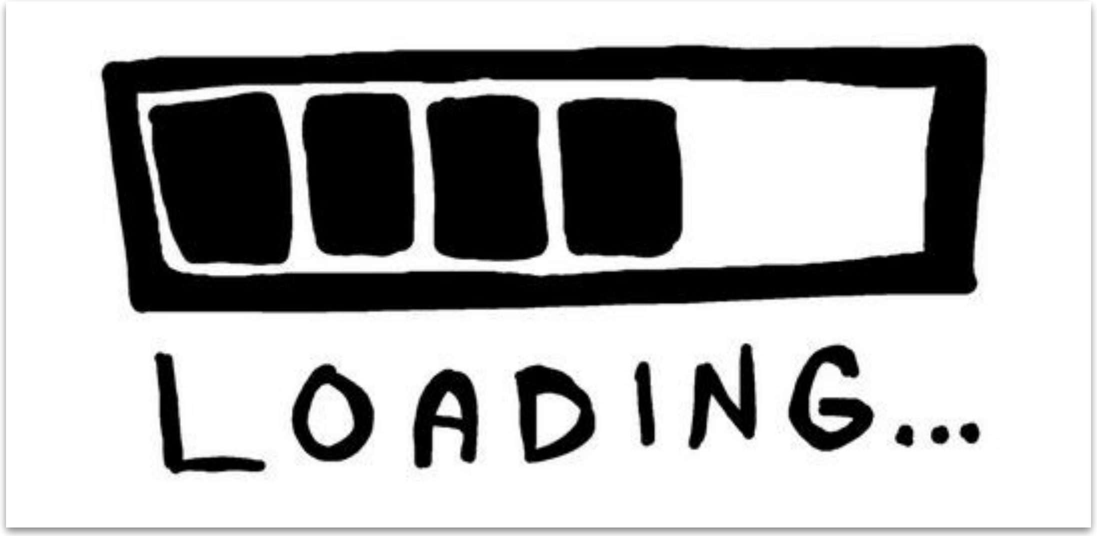
Must be informative

Preferably non-distracting and unobtrusive

Feedback

How informative is this???

?



https://www.videoblocks.com/video/loading-bar-scribble-animation-doodle-cartoon-4k-b03byrauliz20iitl

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Consistency

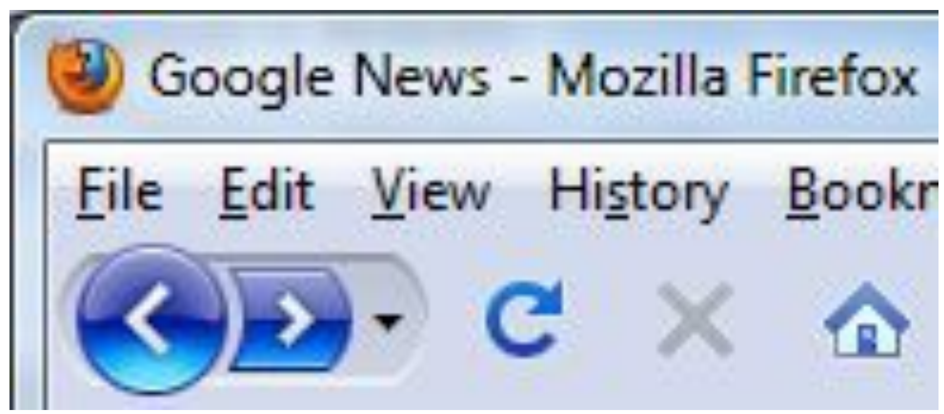
Interfaces should be consistent in meaningful ways

- Ubiquitous use of same keys for cut/copy/ paste

Types of consistency

- Internal (i.e., within itself)
  - e.g., same terminology and layout throughout
- External (i.e., with other applications)
  - e.g., common widget appearance
  - e.g., design patterns common across applications

Is consistency always better?



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Metaphors

Suggest an existing mental model

- “horseless carriages”, “wireless”

Desktop metaphor

- Not an attempt to simulate a real desktop
- Leverages knowledge of files, folders, trash…
  - … and how one object can hide others

Metaphors and Affordances

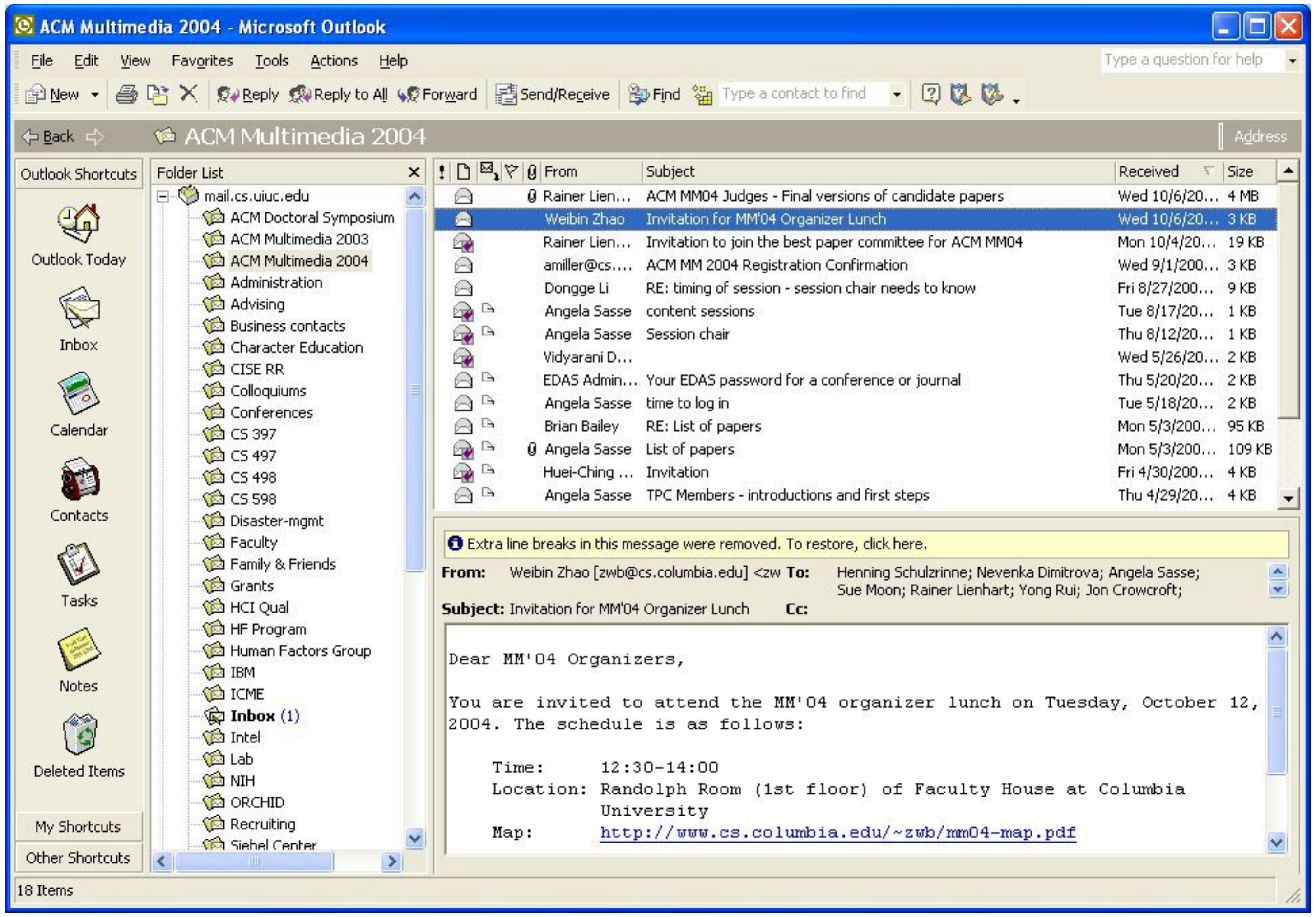
Affordances “jump start” a model for interaction

Metaphors “jump start” a model of a system

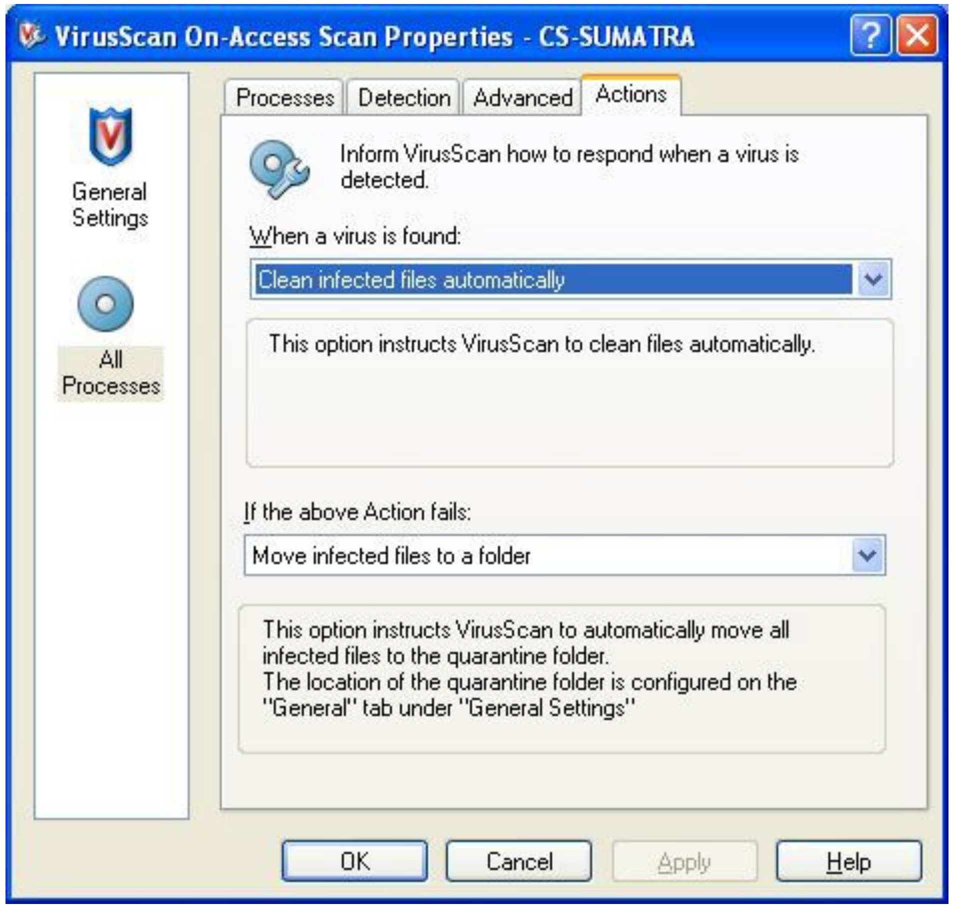
But if designed poorly, both can be damaging

- Lead to an incorrect model, undermine interaction
- Can limit designer creativity
- Can reduce the advantages of software
- Can be “cute” at the expense of functional

Example: Mail Metaphor

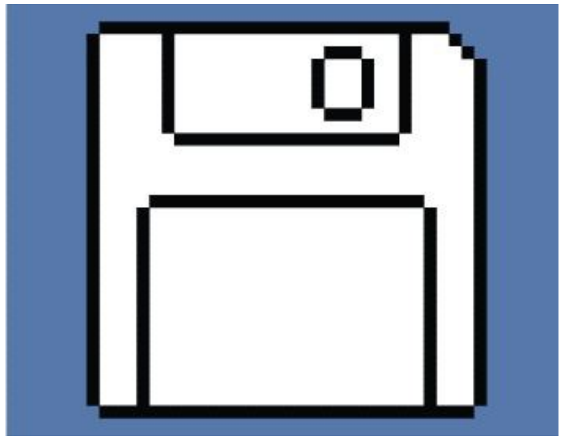


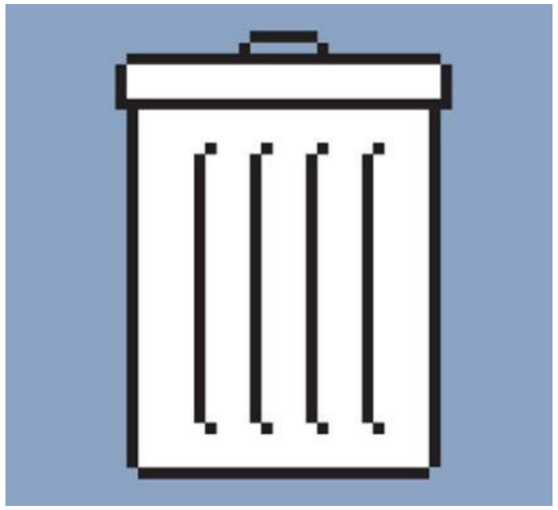
Example: Health Metaphor



Broken Metaphors

Are not consistent, do not operate in every circumstance, or do not uphold things consistent with what the metaphor would suggest





Dead Metaphors

Lost the original imagery of their meaning

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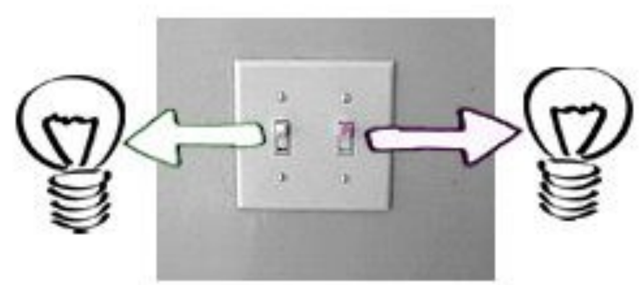
Mappings

Correspondence between an interface
and the corresponding action in 'the world'

Minimize cognitive steps to
transform action into effect, or
perception into comprehension
(i.e., execution and evaluation)

Mappings

Removing the cover plate, then removing and swapping the switches.

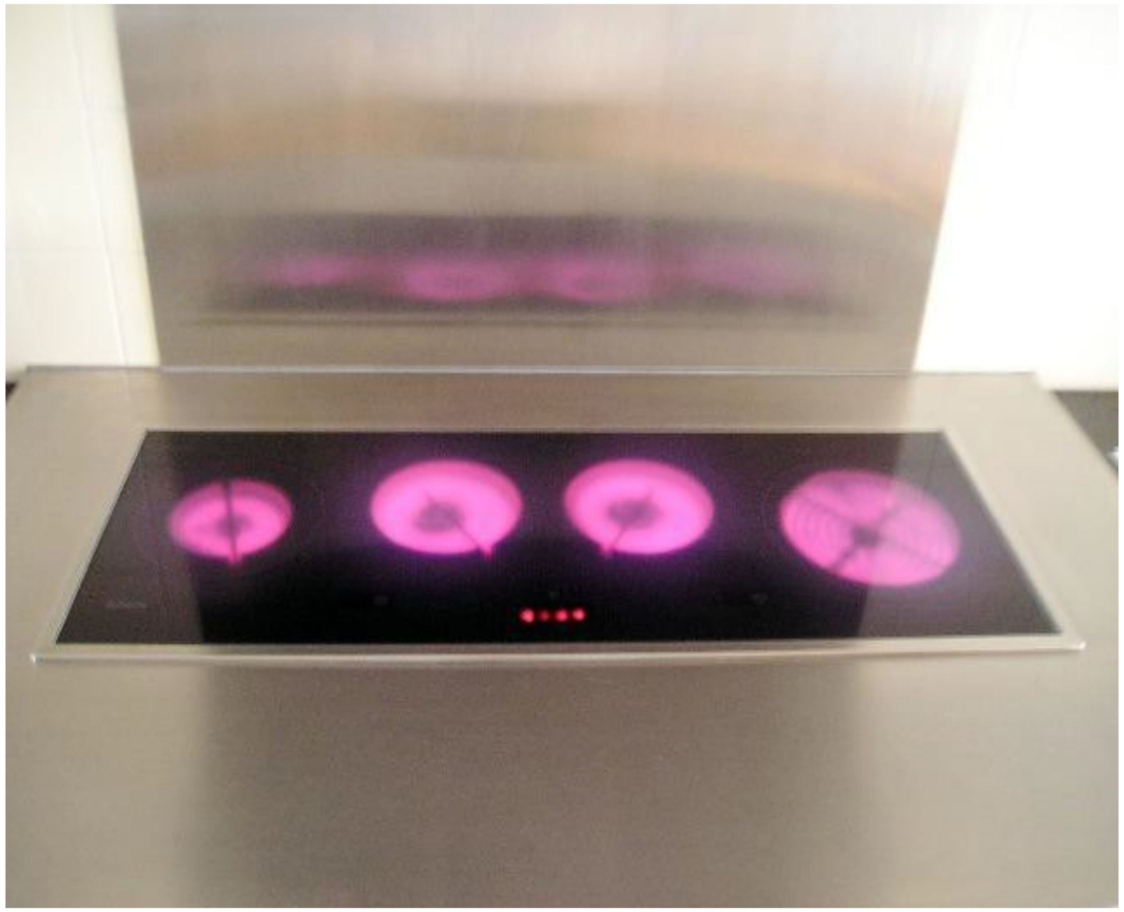


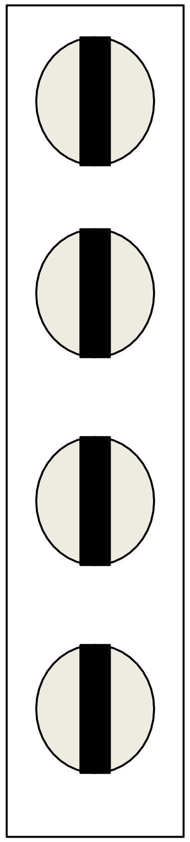
From http://fivesketches.com/2009/11/natural-mapping-of-switches/

Mappings

50
EURO
CENT
20
EURO
CENT
10
EURO
CENT
500 EURO
500
500 EURO
500
10 EURO
10
10 EURO
10
200 EURO
200
200 EURO
200
100 EURO
100
100 EURO
100

Mappings





Mappings

Design principles

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Visibility

Visibility

Differentiate opposing functionality

Use visual function

- to confirm the user's mental model of operation

Sometimes sound can be used to make things ‘visible’

- (e.g. vacuum cleaner clogging up)

Just the right things have to be visible:

- excess is as bad as lack of visible clues

Visibility

Phones

How do you

put somebody on hold

change volume

Visibility

Location of Controls

Display

(This display shows all of the possible configurations.)

0 15-30	During a conversation, the call duration is displayed. (Example: 15 minutes, 30 seconds)
	The unit is in the programming mode (p. 9, 16, 20).
	The AUTO button was pressed while dialing or storing phone numbers for the Speed Dialer (p. 16, 19).
	The LOWER button was pressed (p. 21, 23).
	The ringer is set to OFF (p. 10).
	The MUTE button was pressed during a conversation (p. 24).
	The dial lock mode is set. To cancel the mode, see page 27.
F	The FLASH button was pressed while storing phone numbers.
P	The PAUSE button was pressed while dialing or storing phone numbers.
	You pressed ⊛ while dialing or storing phone numbers in the TONE mode.
	You pressed # while dialing or storing phone numbers in the TONE mode.
	While storing a phone number in an UPPER memory location for the One-Touch Dialer, " " will appear when you press a one-touch auto dial button (p. 20).
	While storing a phone number in a LOWER memory location for the One-Touch Dialer, " " will appear when you press a one-touch auto dial button (p. 21).
[-]	The MUTE button was pressed as a secret button while storing phone numbers (p. 18, 22).
	While programming function items, such as the dialing mode, " " will flash as a cursor.

Preparation

Visibility

Changing Ringer Volume

- Press “Program”
- Press “6”
- Set Volume
  - Low - Press “1”
  - Medium - Press “2”
  - High - Press “3”
- Press “Program”

Visibility

Controls available on watch with 3 buttons?

- Too many and they are not visible

Compare to controls on simple car radio

- Number of controls ≈ Number of functions
- Controls are labeled and grouped together

Visibility

Visibility

Activity: Bad Design Hunt

Can you discover instances of bad design on campus?

False affordances? A lack of consistency, visibility, or mappings?

"Thanks to you, I now constantly notice how badly things are designed." — anonymous student

Questions